

# NASA TECH BRIEF

## *Goddard Space Flight Center*



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

### Mathematical Analysis for the Performance Assessment of Space Communication Parameters, IBM-360 Version

#### The problem:

To optimize parameter values used in determining the communication capability for a one-way transmission.

#### The solution:

Calculations to determine communication capability of a pulse or digital transmission link are basically dependent on a single equation which specifies the probability of detection error for one-way transmission.

#### How it's done:

The variants for the above equation allow, for different types of noise, both modulation and demodulation techniques. This equation also documents the interrelationships among the communication system parameters of range, transmitter power, antenna gains, noise, etc. In an equation with many variables it is possible to trade one parameter against another and still maintain desired performance. This optimization concept was expanded to include all applicable parameter values in the given for both weight and cost. The program COPS (Communication System Optimization Program with Stops), optimizes output and minimizes cost. Fixed values or maximum or minimum values (stops) can be given for any parameter value. The COPS program was written in

FORTRAN IV, requiring a fair degree of programming knowledge to utilize it, therefore COPTRAN (Communication System Optimization Program Translator) was written as a buffer program to translate more easily understood terms into statements acceptable by COPS. This should prove to be a useful tool to aid in investigative programs for space communication.

#### Notes:

1. This program was written in FORTRAN IV for use on an IBM-360.
2. Inquiries concerning this program should be directed to:

COSMIC  
112 Barrow Hall  
University of Georgia  
Athens, Georgia 30601  
Reference: GSC-11523

Source: L. Grayson of  
Computer Sciences Corp.  
under contract to  
Goddard Space Flight Center  
(GSC-11523)

# NASA TECH BRIEF

Publication Number: 73-101

For information on availability of this publication, contact:

NASA Technical Information Service (NTIS)

Springfield, Virginia 22154

or

NASA Technical Reports Library (NTRL)

Washington, D.C. 20546

For information on the availability of this publication, contact:

NASA Technical Information Service (NTIS)

Springfield, Virginia 22154

or

NASA Technical Reports Library (NTRL)

Washington, D.C. 20546

For information on the availability of this publication, contact:

NASA Technical Information Service (NTIS)

Springfield, Virginia 22154

or

NASA Technical Reports Library (NTRL)

Washington, D.C. 20546

For information on the availability of this publication, contact:

NASA Technical Information Service (NTIS)

Springfield, Virginia 22154

or

NASA Technical Reports Library (NTRL)

Washington, D.C. 20546